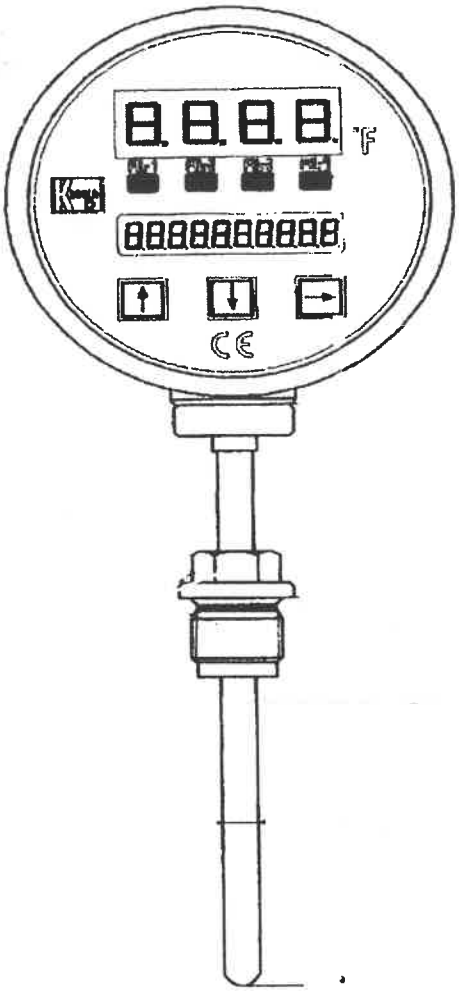
KOBOLD Series TSF26 Digital Temperature Gauge

User Instructions



KOBOLD Instruments Inc. 1801 Parkway View Drive Pittsburgh PA 15205

Phone (412) 788-2830 • Fax (412)-788-4890

Electrical Specifications (continued)

Displays:	
Pressure:	4 digit, 0.5", Green LED
Switch Setpoints:	4 Digit Backlit LCD
Electrical Connections:	Via Terminal Strip
Electrical Protection:	NEMA 4

Table 2.1 Part Number Decoding

TSF26 = Digital Temperature Gauge with Analog Output

-Range = Temp. Range Abbreviation **Available Measuring Ranges**

140820 = -20 to 40	**239820** = -20 to 390	**218000** = 0 to 180	**216132** = 32 to 160
210820 = -20 to 100	**160000** = 0 to 60	**222000** = 0 to 220	**222132** = 32 to 220
216820 = -20 to 160	**180000** = 0 to 80	**230000** = 0 to 300	**230132** = 32 to 300
222820 = -20 to 220	**210000** = 0 to 100	**239000** = 0 to 390	**239132** = 32 to 390
230820 = -20 to 300	**214000** = 0 to 140	**210132** = 32 to 100	

F = Fahrenheit (°F) **Scale**
C = Celcius (°C: +200°C Maximum)

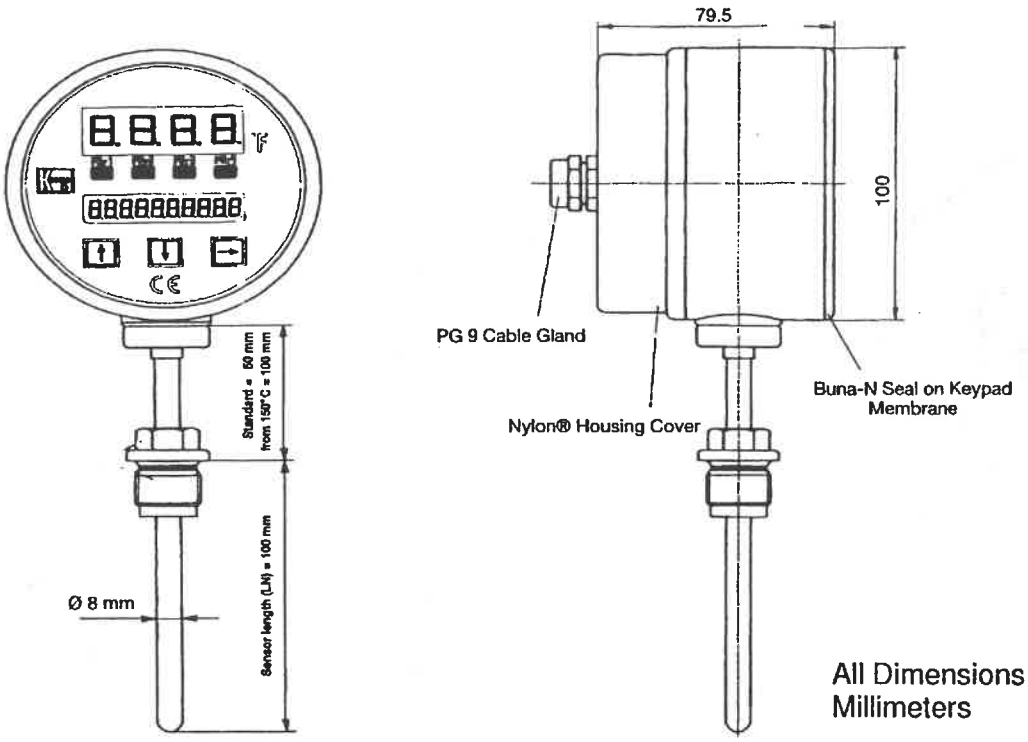
4 = 4-20 mA Output **Analog Output**
0 = 0-20 mA Output
1 = 0-10 VDC Output

G = 2 SPDT Limit Switches **Switches**
H = 4 SPDT Limit Switches

TSF26 -222820 F 4

Sample TSF26 Specification

Diagram 2.1 Dimensions


79.5
100
PG 9 Cable Gland
Nylon® Housing Cover
Buna-N Seal on Keypad Membrane
Standard = 50 mm from 150°C = 100 mm
Sensor length (LN) = 100 mm
Ø 8 mm
All Dimensions in Millimeters

3.0 Mechanical Installation

All dimensions in inches

The following instructions and recommendations should be adhered to in order to ensure proper pressure gauge installation:

3.0.1 For the most accurate measurement, the guage should be installed such that the probe tip is located at the center of the medium being measured

3.0.2 Install the gauge into a properly sized female port. Use of a thread sealant such as teflon tape is recommended to ensure a leaktight seal.

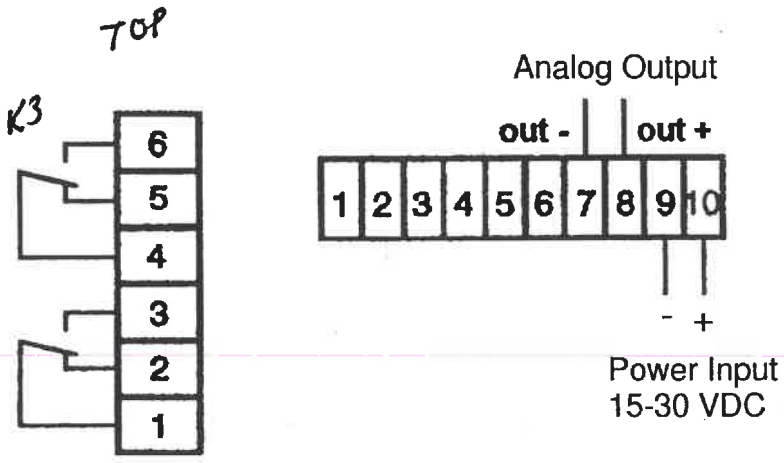
3.0.3 If it is desirable to remove the gauge from the process while the system is filled or pressurized. The gauge should be installed into a properly sized thermowell. Installing in a thermowell will increase the gauge response time. It is therefore recomended that a heat transfer paste is used inside the thermowell to minimize this negative effect

3.0.4 When tightening the gauge into the piping system use a properly sized wrench on the hex just above the threaded portion of the fitting. **Do not use the case of the gauge to apply torque or make or break the pressure connection as this may result in damage to the gauge.**

4.0 Electrical Connections

The DSF26 requires a 15-30 VDC power supply with at least 300 mA steady state current capability. The unit has an inrush current of up to 1 amp during the initial startup transient. It is therefore necessary to ensure that the power supply used with the DSF26 has a transient short-time current capability of at least 1 amp.

Diagram 4.1 DSF26 Electrical Connections

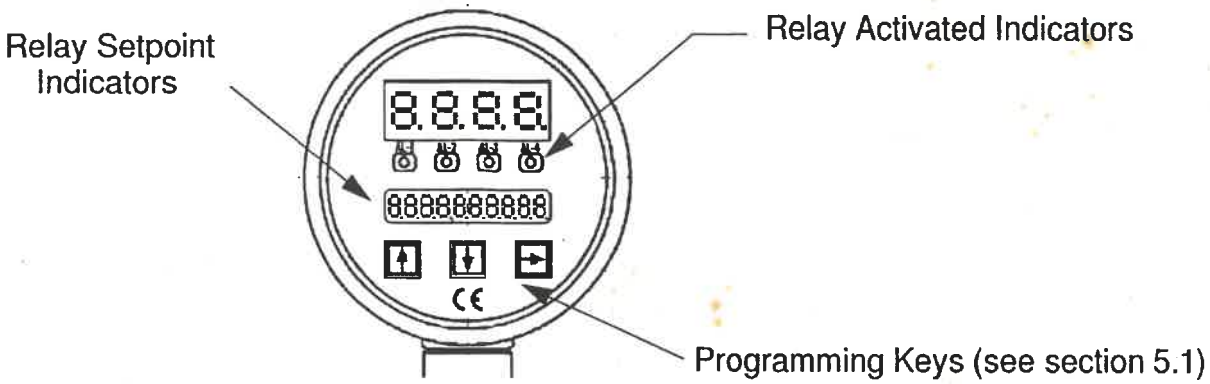


Note 1: Relays are optional

Note 2: Terminal blocks can be unplugged from the body of the gauge housing in order to make wiring connections easier

5.0 Operation

Diagram 5.1 TSF26 Displays and Controls



5.1 Programming, General

Programming is required in order to set the relay parameters and auto-zero the display if needed. The programming menu items are displayed on the LCD display below the main pressure display. The arrow keys on the front of the TSF26 are used to perform the programming as follows:

Depressing the [▼] will place the TSF26 in the programming mode. **EO - EbEnE** will be displayed on the LCD display. There are 4 branches in the programming mode (see Diagram 5.2). Branch 1 sets Relay 1 parameters (setpoint, hysteresis etc.); Branch 2 sets the Relay 2 parameters; Branch three is used for auto- zeroing the display (not required for temperature instruments) and branch four is used only by the factory for initial setup. Menu items in branch 4 are locked and cannot be altered by the user.

Programming key functions when in the programming mode (refer to Diagram 5.2)

[▼] Move to the next menu item

[▲] Move to the previous menu item

[►] Move to the next branch. (only when at the first menu item in a branch)

[▲] & [►] Go back to the operating mode

5.1 Programming, General (cont.)

When the numerical value of a menu item needs to be changed (e.g. changing relay setpoint value) pressing the ► key will release the previous value to allow changing it. the far right digit will be flashing to signify that the setting has been released to be changed. Use ▲ or ▼ to change the value of that digit. Use ► to toggle to the next digit. When the proper value is set, press ▲ & ▼ to enter the new value.

5.2 Programming Code Descriptions

The following is a listing of each programming code for the DSF26 along with a description of its function. Diagram 5.2 shows a flow chart of the programming process:

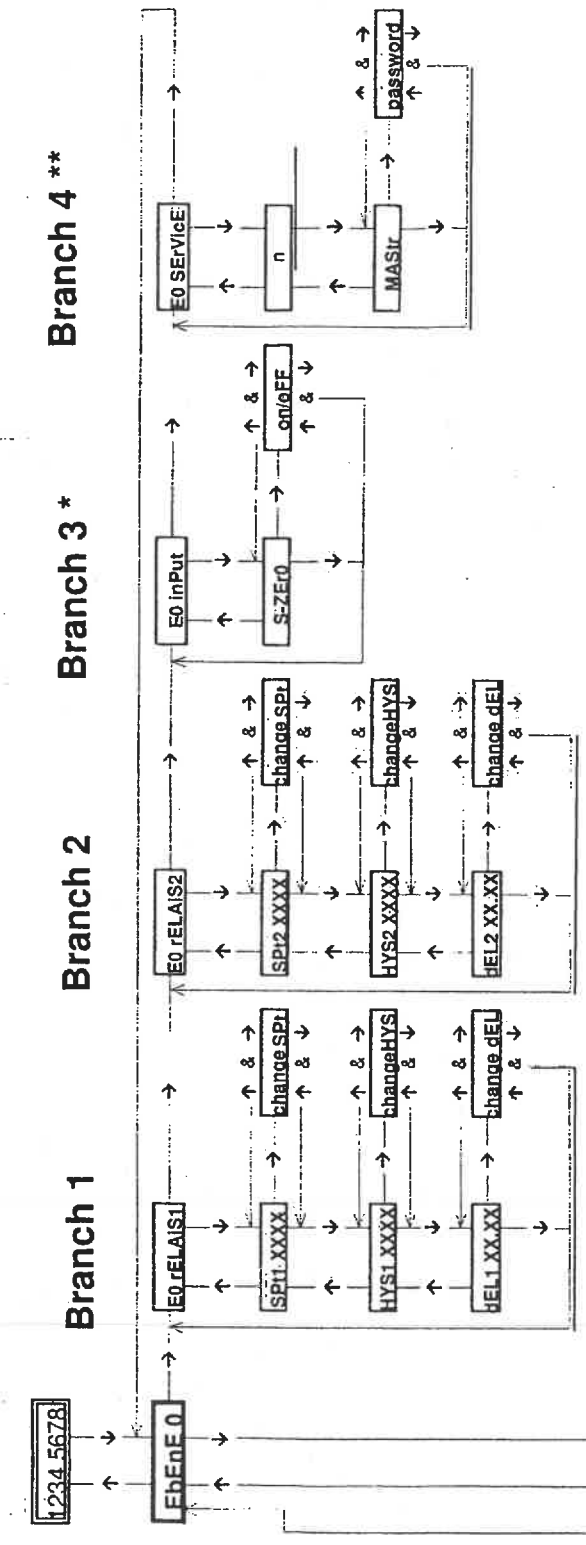
E0 - EbEne — Programming mode enabled. Pressing ► will toggle through each of the 4 programming branches (see Diagram 5.2).

E0 - rELAiS1 — Branch 1 for setting Relay 1 parameters. Use ► to move to the next programming branch. Use ▼ to move down through the Relay 1 branch and set the Relay 1 parameters of setpoint, hysteresis, and delay time.

SPt1 XXXX — Relay 1 activation setpoint. To adjust the setpoint value, press the ► key to release the previous setpoint value. the far right digit will be flashing to signify that the setting has been released to be changed. Use ▲ or ▼ to change the value of the flashing digit. Use ► to toggle to the next digit. When the setpoint value is set, press ▼ & ▲ to enter the new value.

HYS1 XXXX — Relay 1 hysteresis. Hysteresis is defined in this as the temperature setpoint where the relay de-activates. It is designed to allow for a temperature "deadband" between the relay activation and de-activation. To adjust the setpoint value, press th► key to release the previous setpoint value. the far right digit will be flashing to signify that the setting has been released to be changed. Use ▲ or ▼ to change the value of the flashing digit. Use ► to toggle to the next digit. When the setpoint value is set, press ▼ & ▲ to enter the new value.

Diagram 5.2 Programming Flow Chart



* Branch 3 (auto-zeroing) is not required for the TSF 26 Any attempt to perform the auto-zero will be ignored by the electronics

** Branch 4 (E0 - SErVicE) is for factory use and cannot be user accessed

5.2 Programming Code Descriptions (cont.)

dEl1 XXXX — Sets the delay time in seconds for Relay 1 activation.To adjust the setpoint value, press the ► key to release the previous value. the far right digit will be flashing to signify that the setting has been released to be changed. Use ▲ or ▼ to change the value of the flashing digit. Use ► to toggle to the next digit. When the setpoint value is set, press ▲ & ▼ to enter the new value.

E0 - rELAiS2 — Branch 2 for setting Relay 2 parameters. Use ► to move to the next programming branch. Use ▼ to move down through the Relay 2 branch and set the Relay 2 parameters of setpoint, hysteresis, and delay time. The parameters for Relay 2 are set in the same manner as those for Relay 1 above.

E0 - inPUt — Branch 3 for auto-zeroing the display. Auto-zeroing is not required for temperature gauges. Performing the auto-zero is ignored by the electronics and vwill have no affect on the unit

S - ZErO - OFF — Enables auto-zero. Use ► to enable auto-zero "OFF" should flash. Use ▲ to turn auto-zero on. "on" should flash. Use ▲ & ▼ to auto-zero. De-energize and re-energize the unit. The display should read zero.

E0 - SErVicE — Use only for factory setup. Use ► to toggle back to E0 - EbEnE or ▲ and ► to return to the operating mode.

6.0 Maintenance

The TSF26 is an electronic device with no wear parts other than the relay contacts which if properly connected will last for several hundred thousand cycles. The only maintenance required on this device may be an occasional cleaning of the sensing probe if a coating or dirty process media exists. Possible indicators of a dirty sensing probe would be sluggish response to changes in process temperature.

7.0 Need Help With Your TSF26?

Call one of our friendly engineers at (412) 788-2830

CAUTION: For safety reasons, please read the cautionary information located at the end of the manual, before attempting installation.

1.0 General

The TSF26 employs a Pt-100 resistive thermal device (RTD) sensing element whose resistance varies in proportion to a temperature change. This variable resistance signal is conditioned to provide an LED display and analog output. Optionally this meter can be provided with up to 4 switches whose switch points and hysteresis are programmable.

2.0 Specifications

General Specifications

Ranges:	-20 to +390°F
	-20 to +200°C
Maximum Pressure:	1450 PSIG
Sensor Type:	Pt-100 RTD
Accuracy:	±0.5% of full scale ± 1 digit
Linearity:	±0.2% of full scale
Repeatability:	±0.1% of full scale
Operating Temperature:	
Medium:	-20 to +390°F
Ambient:	-5°F to 140°F
Storage:	-40°F to 160°F
Materials of Construction:	
Wetted Parts:	316 Ti-Stainless Steel
Housing:	304 Stainless Steel, Nylon

Electrical Specifications

Power Supply:	15-30 VDC, 300 mA Max. steady state, 1 amp inrush
Analog Output:	
Current:	0-20 mA or 4-20mA into 500 ohms Max.
Voltage:	0-10 VDC into 500 Ohms Min.
Zero Adjust:	±25% of full scale
Relays:	
Type:	SPDT
Setpoints:	Field Adjustable
Hysteresis:	Field Adjustable
Max. Voltage:	250 VAC, 220 VDC
Max. Current:	3 Amps
Max. Power:	50 VA, 60 Watts

CAUTION

PLEASE READ THE FOLLOWING WARNINGS BEFORE ATTEMPTING INSTALLATION OF YOUR NEW DEVICE. FAILURE TO HEED THE INFORMATION HEREIN MAY RESULT IN EQUIPMENT FAILURE AND POSSIBLE SUBSEQUENT PERSONAL INJURY.

- **User's Responsibility for Safety:** KOBOLD manufactures a wide range of process sensors and technologies. While each of these technologies are designed to operate in a wide variety of applications, it is the user's responsibility to select a technology that is appropriate for the application, to install it per these installation instructions, to perform tests of the installed system, and to maintain all components. The failure to do so could result in property damage or serious injury.
- **Proper Installation and Handling:** Use a proper sealant with all installations. Never overtighten the unit within the fitting. **Never use the housing to thread the unit into its fitting**. Always use only an appropriate sized wrench on the hex portion of the probe. Always check for leaks prior to system start-up.
- **Wiring and Electrical:** The sensor is designed to operate within the voltage and current limits listed in section 2.0, Specifications. The sensor systems should never exceed these ratings. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.
- **Temperature and Pressure:** The TSF26 is designed to operate within the temperature and pressure limitations listed in section 2.0, Specifications. Operation outside these limitations will cause damage to the unit and possible personal injury. Fluids should never be allowed to freeze inside the sensor mechanism. The expansion of the fluid which occurs when fluids freeze may cause damage to the sensing mechanism or probe.
- **Material Compatibility:** Check your model number with the wetted materials specification in Section 2.0 ,"Specifications", on page 1 of this manual. Make sure that the model which you have selected is chemically compatible with the application liquids. While the switch housing is liquid resistant when installed properly, it is not designed to be immersed. It should be mounted in such a way that it does not normally come into contact with fluid.
- **Flammable, Explosive and Hazardous Applications:** The TSF26 is not an explosion-proof design. It should not be used in applications where an explosion-proof design is required.
- **Make a Fail-safe System:** Design a fail-safe system that accommodates the possibility of switch or power failure as well as operator error. In critical applications, KOBOLD recommends the use of redundant backup systems and alarms in addition to the primary system.